FIG. 1
(Related Art)

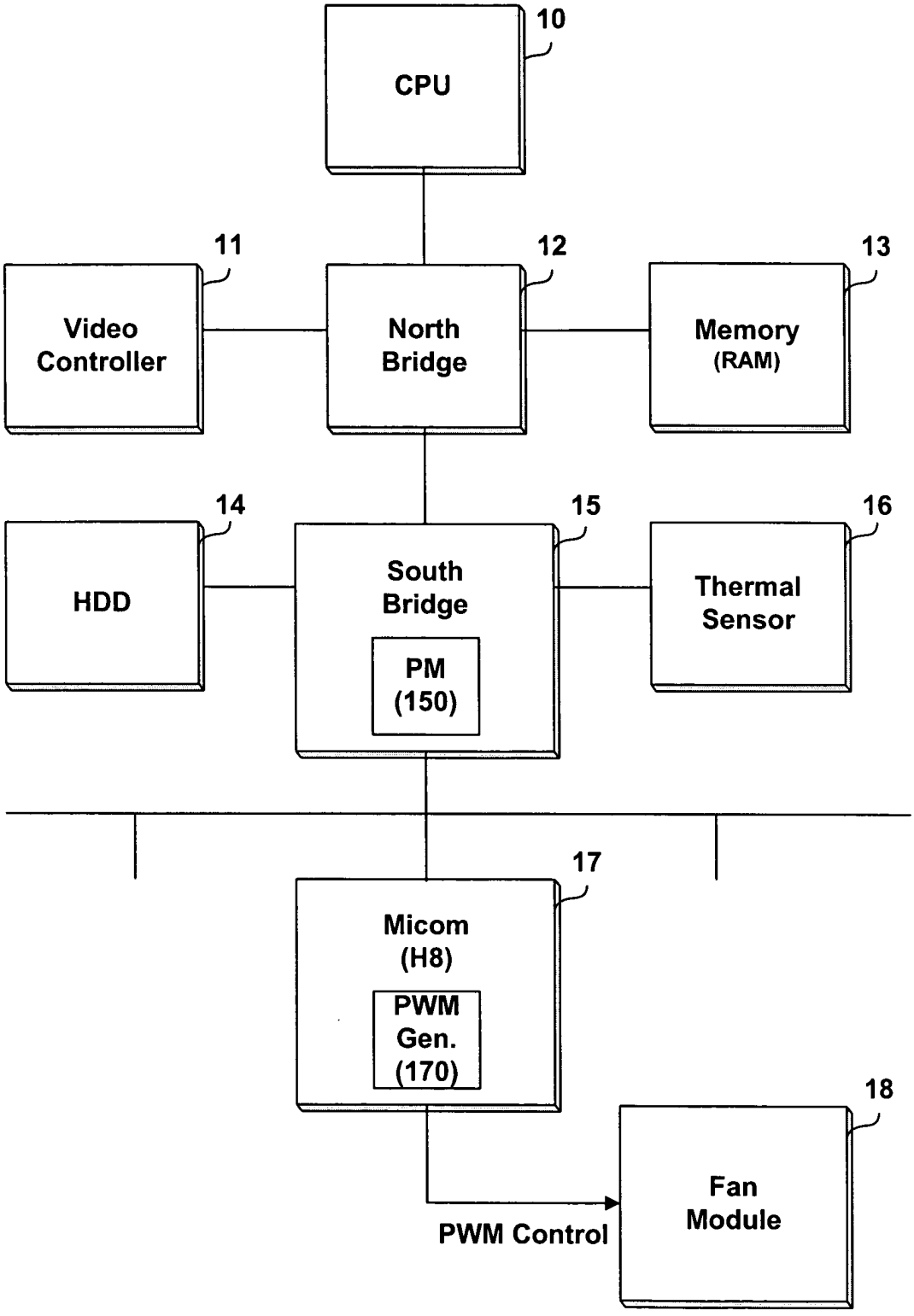


FIG. 2
(Related Art)

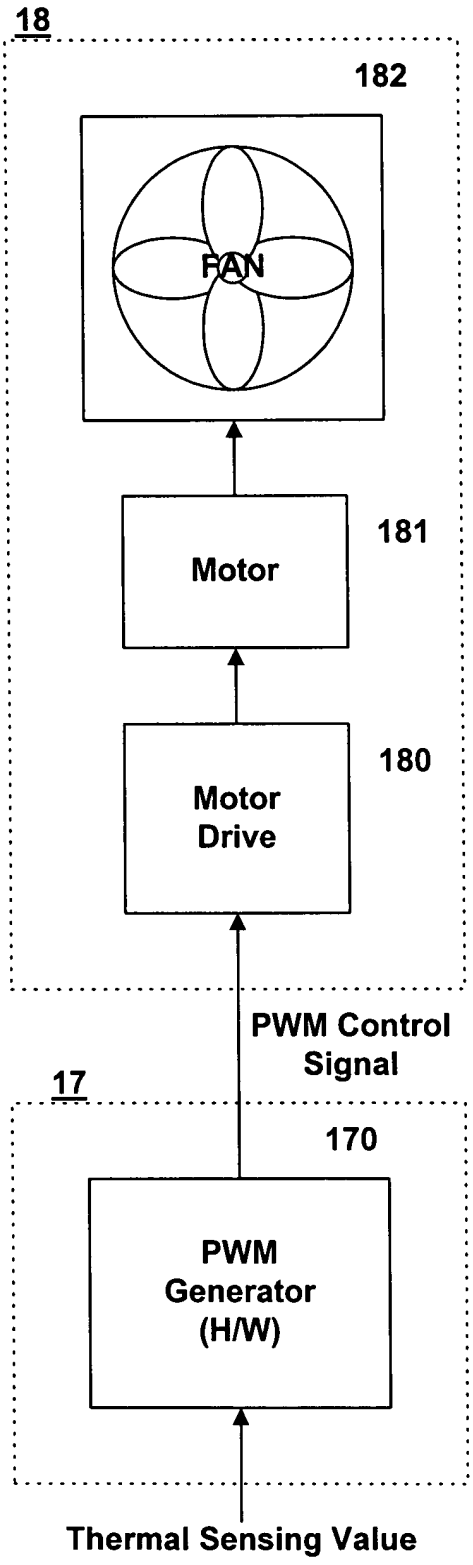


FIG. 3
(Related Art)

4bits-Resolution PWM Control Signals Generator

Steps	PWM Control Signals (PWM Patterns)	Motor Speeds (RPM)
Step 0	PWM Pattern 0	0 (min)
Step 1	PWM Pattern 1	300
Step 2	PWM Pattern 2	600
Step 3	PWM Pattern 3	900
Step 4	PWM Pattern 4	1200
⋮	⋮	⋮
Step 11	PWM Pattern 11	3300
Step 12	PWM Pattern 12	3600
Step 13	PWM Pattern 13	3900
Step 14	PWM Pattern 14	4200
Step 15	PWM Pattern 15	4500 (max)

FIG. 4

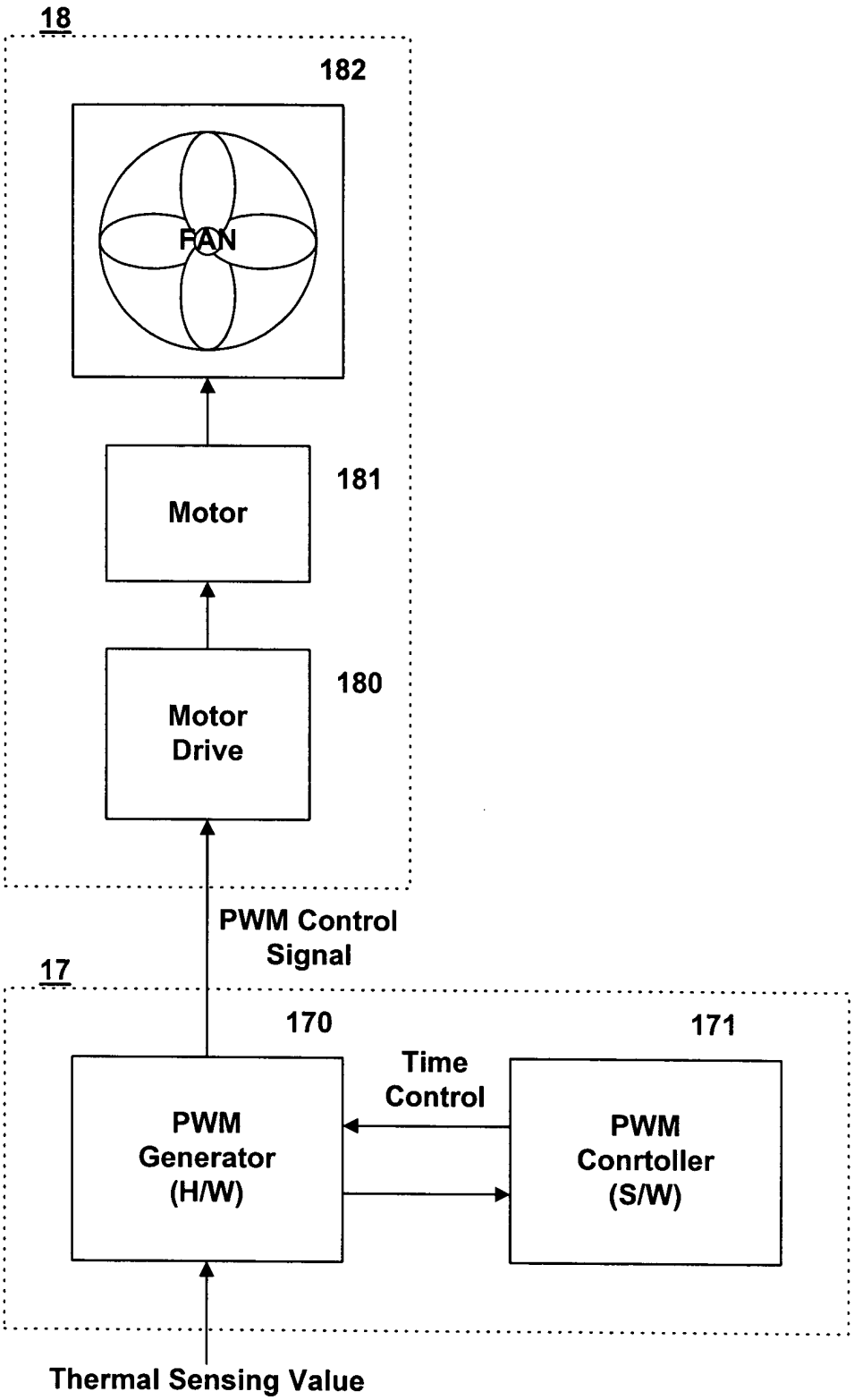

18
182
FAN
Motor
181
Motor Drive
180
PWM Control Signal
17
170
171
Time Control
PWM Generator (H/W)
PWM Conrtoller (S/W)
Thermal Sensing Value

FIG. 5

Information of Steps of 8 bits-Resolution and Motor Speeds

Steps	Motor Speeds (RPM)
Step 0	0 (min)
Step 1	18.75
Step 2	37.5
⋮	⋮
Step 176	3300
⋮	⋮
Step 187	3506.25
⋮	⋮
Step 192	3600
⋮	⋮
Step 240	4500
⋮	⋮
Step 255	4781.25 (max)

11

5

FIG. 6

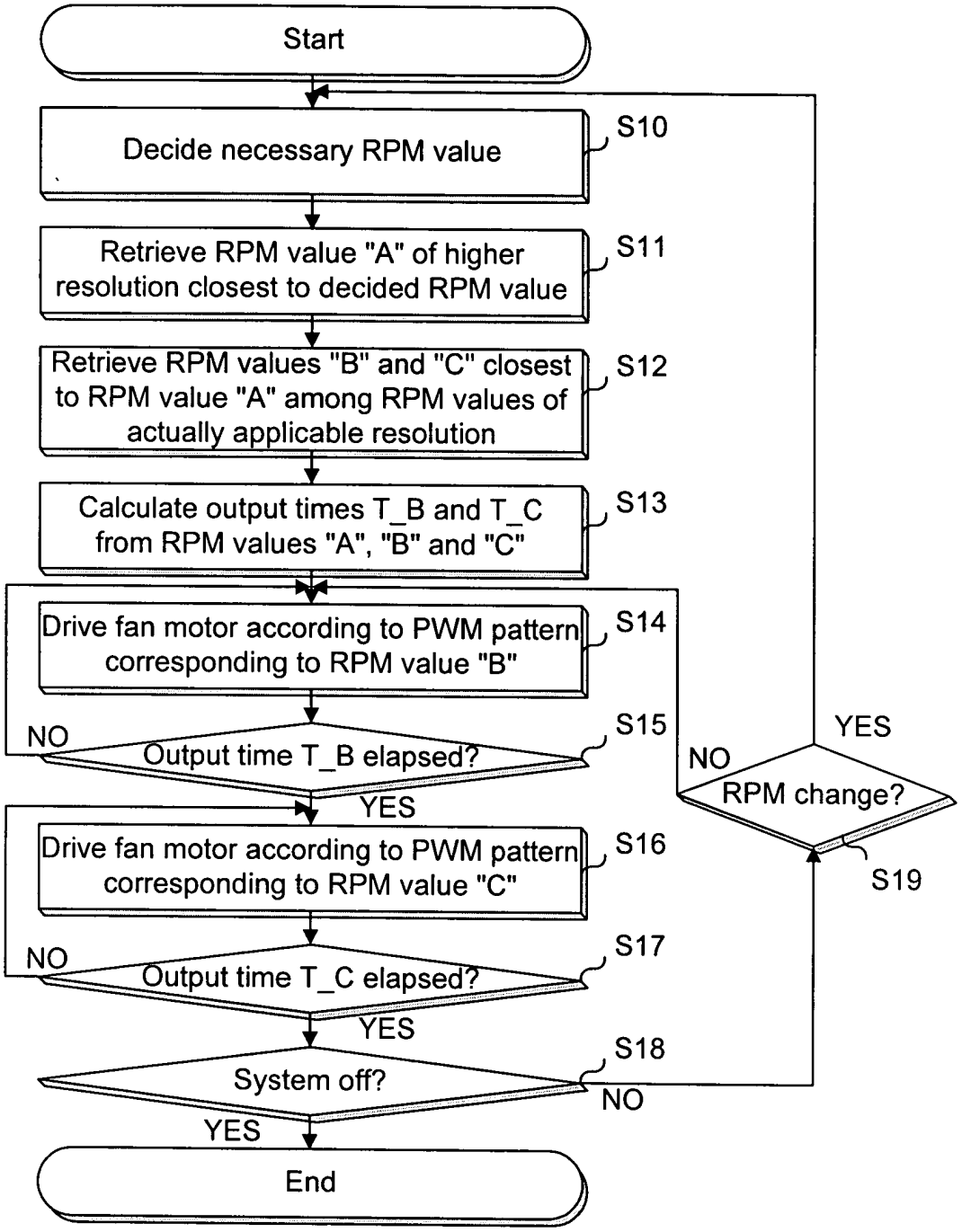

Start
Decide necessary RPM value
S10
Retrieve RPM value "A" of higher resolution closest to decided RPM value
S11
Retrieve RPM values "B" and "C" closest to RPM value "A" among RPM values of actually applicable resolution
S12
Calculate output times T_B and T_C from RPM values "A", "B" and "C"
S13
Drive fan motor according to PWM pattern corresponding to RPM value "B"
S14
NO
Output time T_B elapsed?
S15
YES
Drive fan motor according to PWM pattern corresponding to RPM value "C"
S16
NO
Output time T_C elapsed?
S17
YES
System off?
S18
NO
YES
End
YES
NO
RPM change?
S19

FIG. 7

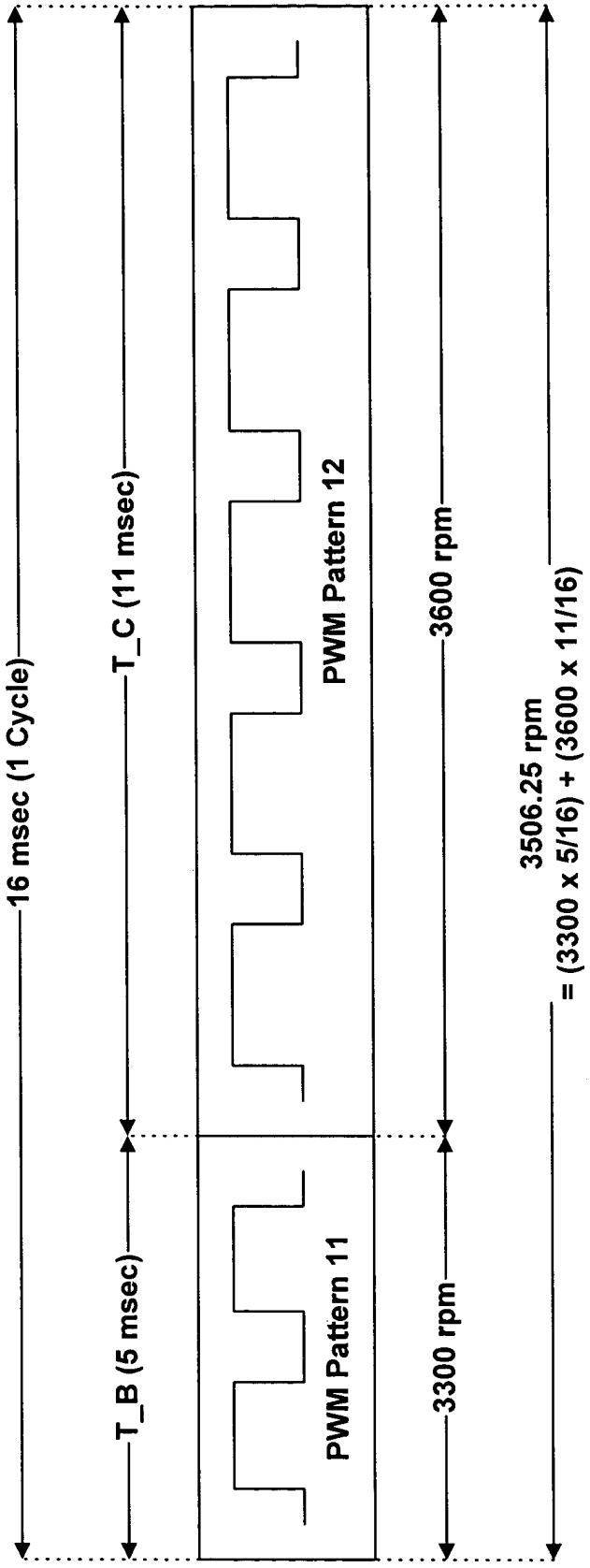

16 msec (1 Cycle)
T_C (11 msec)
T_B (5 msec)
PWM Pattern 12
PWM Pattern 11
3600 rpm
3300 rpm
3506.25 rpm
= (3300 x 5/16) + (3600 x 11/16)

FIG. 8

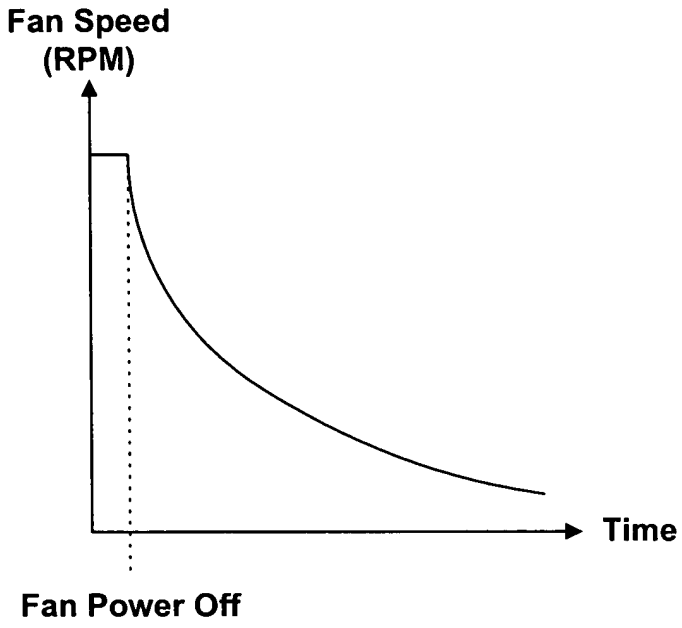
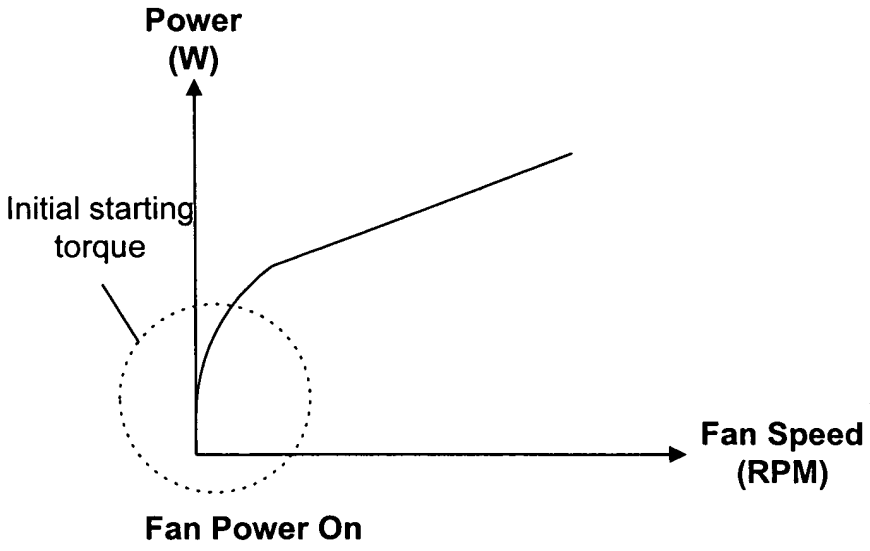

Fan Speed
(RPM)
Time
Fan Power Off

FIG. 9


Power
(W)
Initial starting
torque
Fan Speed
(RPM)
Fan Power On

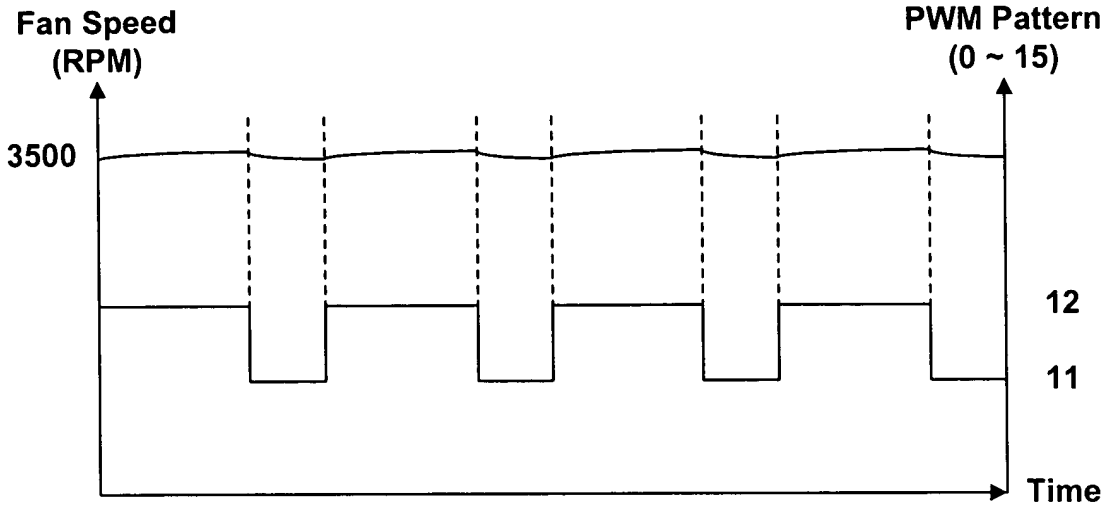



FIG. 10